WHEN AMERICA IS FIFTY YEARS OLDER

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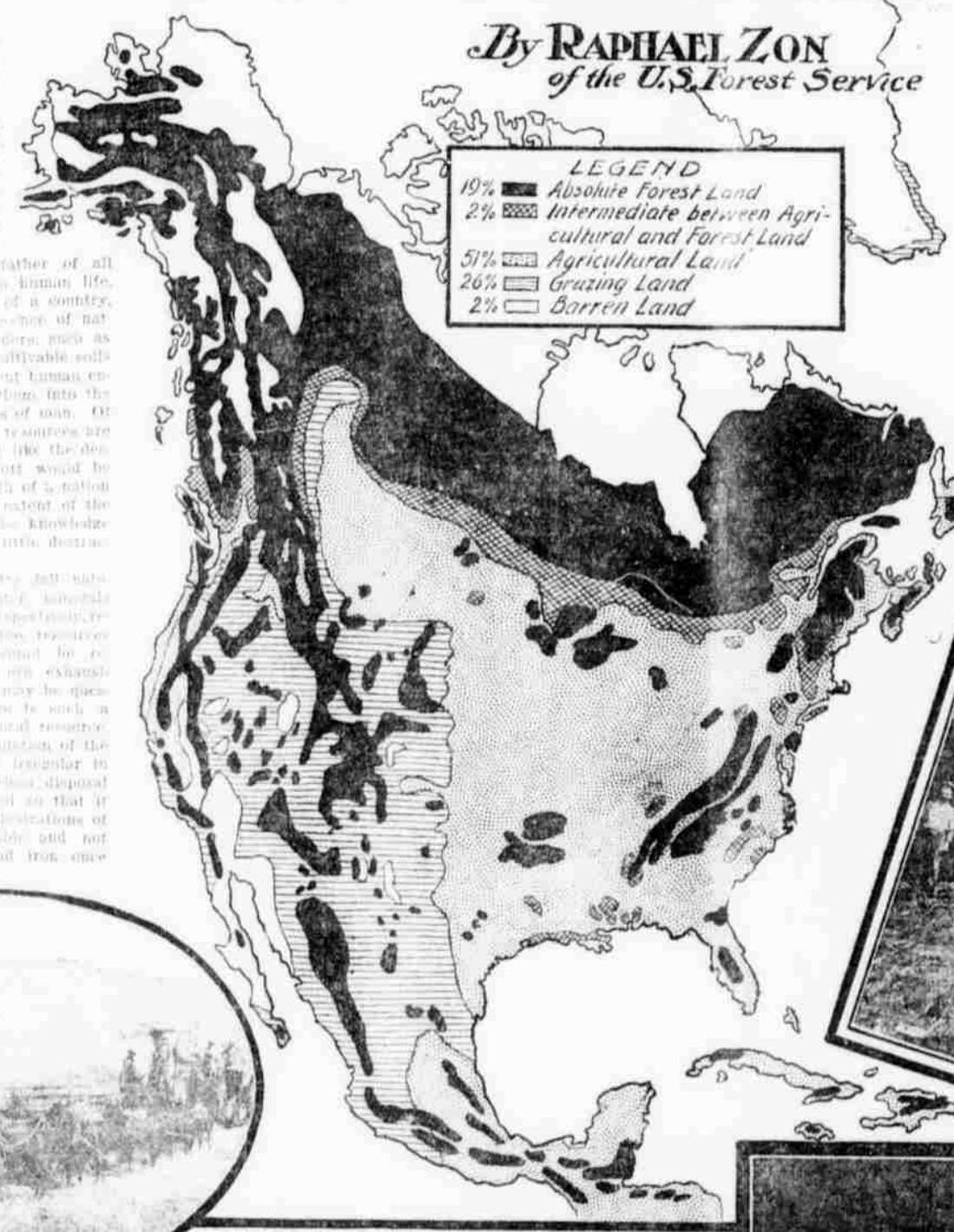
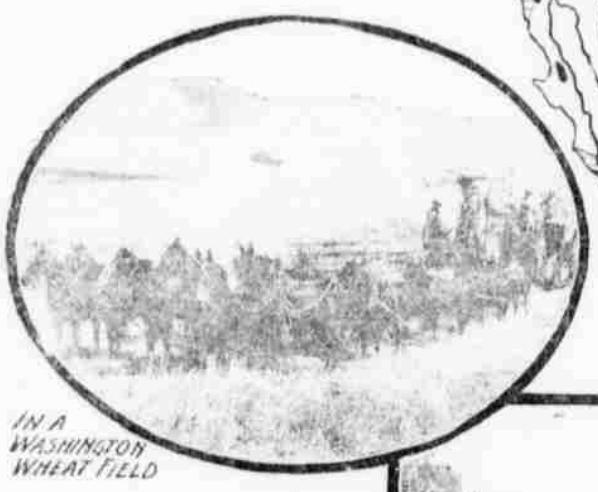
IN THE last analysis all material wealth, all the comforts and necessities of life, are the product of two elements—nature and labor. It may be truly said that nature, or the earth, is the mother of labor and the father of all products necessary to sustain human life. The richness and prosperity of a country, therefore, depend on the presence of natural resources within its borders, such as water, minerals, forests and cultivable soils on the one hand, and intelligent human energy on the other to shape them into the forms necessary for the needs of man. Of the two elements the natural resources are indispensable, for in a country like the desert of Sahara all human effort would be of but little avail. The growth of a nation depends, therefore, upon the extent of the natural resources and upon the knowledge of how to use them with as little destruction as possible.

The resources of a country fall naturally into three groups: water, minerals and land, which represent, respectively, resources which are inexhaustible, resources which are exhaustible and cannot be renewed, and resources which are exhaustible but can be renewed. It may be questioned, indeed, whether there is such a thing as an inexhaustible natural resource. Even water, through the deterioration of the drainage basins, may become irregular in its flow, or through the careless disposal of refuse may become polluted so that it cannot be used. Mines are illustrations of resources which are exhaustible and not renewable. Gas, oil, coal and iron once gone are gone forever.

Of all the natural resources the only one which contains within itself the possibility of infinite renewal is land. The nation should therefore be most vitally concerned with the conservation and improvement of this resource. Human control over such natural resources as minerals is limited. The only possible means of conservation is the avoidance of waste, but their ultimate exhaustion is unavoidable. With agricultural and forest land, however, it is otherwise. Land can not only be conserved, but constantly improved and its yield increased. While in England the iron ores and the coal are becoming constantly harder to get and their exhaustion is threatened, the agricultural land, after a thousand years of cultivation, is now more productive than ever. The wheat fields of England, under intensive cultivation, yield 30 bushels to the acre, while the virgin fields of America on an average yield less than 15.





IN A WASHINGTON WHEAT FIELD

A REDWOOD CUT IN CALIFORNIA

DEVELOPMENT OF WATER POWER

IN THE NORTHWEST WOODS

If a far-sighted national policy in the conservation of natural resources is to make provision for an ever-increasing population, then the greatest possibilities lie in the direction of developing the land in all its forms—field, forest and range—for, notwithstanding all possible economy in the use of the non-renewable resources, they are bound to decrease as time goes on.

One hundred years ago the United States east of the Mississippi river was an almost unbroken forest, comprising something over 1,000,000 square miles, or about 700,000,000 acres. Now, after about a century of settlement, there are not more than 300,000 square miles of merchantable forest land in the eastern United States. About 330,000 square miles have been cleared for farm land. The remainder has been culled of its valuable timber and devastated by fire or else turned into useless brush land. With the growth of population and the greater demand for agricultural land, the ratio between farm and forest land will change still further. The forests will be more and more crowded into the mountains and upon soils too thin or too poor for agricultural purposes. It may be safely assumed that in 50 or 100 years the proportion of land devoted to the different purposes will change almost as much as it has during the past century. These changes will occur especially in the eastern part of the United States, because there the forest is not confined, as it is in the west, to high altitudes, where agriculture is generally impracticable. In the west the forests, with a few exceptions, as in the low country around Puget sound, are in the mountains, which rise in the midst of semi-arid plains, and their original area of 150,000 square miles, half of which lies in the Sierra Nevada and in the Cascades and half in the Rockies, has changed but very little since settlement. In the west the increase of agricultural land must be secured chiefly through the irrigation of the semi-arid land.

If we take a long look ahead into the future and try to picture to ourselves what will be the ultimate proportion of farm, forest, range and desert in this country 50 years from now, in the light of the increasing demand for agricultural land and of an approximate knowledge of the climatic conditions and the physical properties of the different lands in this country, we shall get something like the condition shown in the diagram.

The area devoted to agriculture in a half century, instead of being 21 per cent. of the total area, as it is now, will be nearer 50 per cent. That this is not an overestimate is indicated by the fact that during the last 50 years the improved farm land in this country has advanced from 113,000,000 acres to 415,000,000 acres, an increase of nearly 270 per cent.

With more intensive methods of cultivation larger yields will undoubtedly be obtained from the same area, yet the area itself under agricultural crops will have to be increased, especially if we are to remain an exporting country.

In Belgium the arable land forms 63 per cent. of the total land area, in Denmark 68, in France 48, and in Germany 47. These countries are not exporters of cereals, although their methods of cultivation are highly developed. France is especially interesting as a criterion, because its methods are most intensive and it is the only country that is self-sustaining; it produces 98 per cent. of all the cereals which it consumes. There is little doubt that our population in the next 50 years will reach 50,000,000, or about 50 persons per square mile. Whether the acreage of improved farm land will increase at a much faster rate than the population, as has been the case in the past, or whether it will grow at the same or even a slower rate than the population, the future alone can tell; but increase it must.

In mountainous Switzerland only 17 per cent. of the land is cultivated, and in Sweden and Norway, situated in an unfavorable climate and with a scanty population (29 and 18 persons per square mile, respectively), the proportion of arable land is 8.7 per cent. and 1.3 per cent., respectively.

Land chiefly valuable for grazing will form about one-fifth of the extent of the United States proper. This land originally lay west of the one hundredth meridian. In the plains and mountain valleys, but with the advance of dry farming its eastern boundary has been shifted farther west to about the one hundred and third meridian. This land receives but a scanty rainfall and can produce neither forest nor field crop, but supports a vegetation of hardy grasses. It was formerly the natural range of millions of buffalo and is now the grazing ground of herds of cattle and sheep. This land will remain largely a natural range, since the area which can be irrigated and thus reclaimed for agricultural purposes, or which can be used for dry farming, is comparatively small.

According to government estimates, the available water will be sufficient to irrigate 71,000,000 acres, or one acre in 7½ of the whole region. The reclamation service, however, does not expect to reclaim more than five per cent. of all the arid land. This area, together with that used for dry farming, will barely suffice to counterbalance the reduction of the productive area in the United States through the growth of cities, the building of railroads and the general development of commerce and non-agricultural industry. The possibilities for increasing the productiveness of the 200,000,000 acres of our public grazing land are very great.

About two per cent. of the total land area will forever remain desert. There are but few areas within the United States which, on account of the intense heat, very low temperatures, alkali or lack of rainfall, are unfit for the use of man and may be truly considered desert land. Such land is found in the Southwest about the Gulf of California, in Nevada, in Utah and in Oregon in the form of arid basins. Ice-bound deserts are found in Alaska and on the glacier-covered mountains. This land must, so long as the climatic conditions of the country continue as they are, remain unproductive.

The land chiefly valuable for growing forests will shrink to about 360,000,000 acres, less than one-fifth of the extent of the United States proper. Together with the wood lots, which will continue to form part of the farm land, the total forest area will amount to approximately 450,000,000 acres, or a fourth of the total land area.

Will this area be sufficient to provide a population of 150,000,000 people with all the timber needed for construction, ties, poles, pulp and all the various uses for which wood seems to be the only suitable material and to protect the soil from erosion, regulate the stream flow and exert its wholesome influence upon the lives of the people?

With the exception of those countries which have naturally a humid climate, like Great Britain or the Netherlands, the countries with a forest area of only 20 per cent. or less show usually to a marked degree bad climatic conditions, with prolonged droughts, frosts and alternating floods and low water, as a result of the reduced forest area. Portugal, with a forest area of only 3½ per cent. of the total; Spain, with 16 per cent.; Greece, with 13 per cent.; Turkey, with 20 per cent., and Italy, with 14 per cent., are good examples.

While the area absolutely necessary for the regulation of streams and the protection of soils can be determined only approximately and indirectly, the area necessary to make a country self-sustaining as regards the production of timber can be found with greater accuracy. If we compare the exports of the different countries with the forest area for every 100 inhabitants we find that countries with 92 acres or more per 100 inhabitants have a surplus of exports over imports, while those with 85 acres or less have a surplus of imports over exports. Apparent exceptions to this rule appear in the cases of Bulgaria and Servia. These countries, while at present importing more wood than they export, possess considerable areas of forest, now inaccessible, and, with the development of means of exploitation and the increased demand for lumber they will in time become exporting countries.

From this we may infer that a country in order to be self-sustaining as regards its timber supply must have an area of about 100 acres of forest land for every 100 inhabitants. The area necessary to supply all the wood needed for home consumption will vary of course with the per capita consumption; and the 100 acres per 100 inhabitants must be considered the minimum area, because it is based upon a moderate per capita consumption such as is found in densely populated countries of Europe, like Germany or France.

The same minimum area for every 100 inhabitants necessary to make a country self-sustaining can also be deduced in another way. At present Germany imports 353,000,000 cubic feet of wood from abroad. To produce this amount of timber Germany would have to possess a forest area of 17,000,000 acres in addition to the 35,000,000 now available. In other words, she would need 52,000,000 acres of forest in order to meet her own timber requirements, or 93.2 acres for every 100 inhabitants. Germany is an extremely good example with which the productivity of the forests of all other countries can be compared, because her forests can be taken as a standard of productiveness.

In this country, where the per capita consumption is six times as great as that in Germany or France and the annual growth per acre may be estimated roughly as one-third of that in those countries, the forest area would have to be 1,600 acres for each 100 inhabitants, or more than twice the present area, in order to maintain the present cut. The present area of 775 acres for every 100 inhabitants at the present per capita consumption and annual growth per acre would be sufficient to meet our own needs if there were not present a supply of virgin timber, the accumulated capital of centuries, to meet the deficiency. With the exhaustion of this remaining virgin supply, which can last only about 50 years more, there must come a time when not only all our exports of timber must cease, but there will not be enough wood for home consumption.

Even as it is, the total exports of wood from this country amount to only five per cent. of the lumber cut, while the surplus of exports over imports is only 1.8 per cent.—an insignificant amount. This shows clearly that we have practically ceased to be an exporting country and the tendency will be more and more toward becoming a wood-importing country.

How shall this shortage be met?

With an increasing demand for land for agricultural crops there is little hope of increasing the extent of forest land. As we have seen, the area necessary for this purpose would have to be more than double the present area and this is entirely out of the question. Much of the land now under forest, but capable of producing crops, will have to be cleared and tilled to provide for an increased population. All the evidence, therefore, is that the land under forest will during the next 50 years be reduced to 450,000,000 acres and this reduced area will have to provide for a population almost twice as large as the present. Nor will there be much hope for covering the shortage of our home production by importations from abroad.

The demand for timber is constantly growing all over the world. It increases at the rate of five per cent. annually. If we compare the total excess of imports over exports of all wood-importing countries of Europe with the total excess of exports over imports of all wood-exporting countries we shall find that there is a deficit for Europe of 141,000,000 cubic feet, which is met at present by imports from North America. Sweden, Norway and Austria-Hungary have already touched the highest point in their exports. Russia could probably increase to some extent its exports from the north, where there are still large areas of virgin forest, but the growing scarcity of timber in the other parts of the empire make it very unlikely that larger supplies of timber for export will be available. Canada is still able to increase its exports, but the drain upon the Canadian forests is growing every year and they will remain the only source of supply to satisfy the urgent needs of the rest of the world for coniferous timber after Austria-Hungary and Russia cease to be exporting countries.

The growing demand for wood material must be met, then, not by an increase of the forest land nor by depending on imports from abroad, but by an increase in the productiveness of the forest and a decrease in the waste, to which chiefly is due the fact that the United States has the greatest per capita consumption in the world.